



**TREMOLUX™**

(This is the model name for warranty claims)

p/n 8151500000 (Tremolux 120V)

# SERVICE MANUAL



## **ATTENTION:**

### **WARRANTY SERVICE PROCEDURES**

The Tremolux™ Amplifier is considered to be field serviceable to the component level. As such stuffed PCB Assemblies are not readily available for this unit. Any Fender Authorized Service Center in need of a warranty replacement PCB Assembly should contact Fender Customer Service at (866) 345-3642, or by email at [service@fender.com](mailto:service@fender.com). You will be given instructions on how to proceed with the repair at that time.



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## IMPORTANT NOTICE

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specifications are subject to change without notice. This information and any copies produced electronically or otherwise must be surrendered upon demand of Fender Musical Instruments Corporation.

• Parts marked with two asterisks (\*\*) indicate the required use of that specific part. This is necessary for RELIABILITY and SAFETY requirements. **DO NOT USE A SUBSTITUTE!**

## PARTS LIST CODES

The description codes used in the itemized Parts Lists are defined below:

### CAPACITOR CODES

CAP AE = Aluminum Electrolytic  
CAP CA = Ceramic Axial  
CAP CD = Ceramic Disk  
CAP CR = Ceramic Radial  
CAP MPF = Metalized Polyester Film  
CAP MY = Mylar  
CAP PFF = Polyester Film/Foil

### RESISTOR CODES

RES CC = Carbon Comp  
RES CF = Carbon Film  
RES FP = Flame Proof  
RES MF = Metal Film  
RES MOX = Metal Oxide  
RES WW = Wire Wound

### HARDWARE CODES

BLX = Black Oxide  
CR = Chrome Plated  
HWH = Hex Washer Head  
M = Machine Screw  
NI = Nickel Plated  
OHP = Oval Head Phillips  
PB = Particle Board  
PHP = Pan Head Phillips  
PHPS = Pan Head Phillips Sems  
SMA = Sheet Metal "A" Point  
SMB = Sheet Metal "B" Point  
SS = Stainless Steel  
TF = Thread Forming  
ZI = Zinc Plated



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## SPECIFICATIONS

<b>Model Name:</b>		<b>Tremolux</b>
<b>Release Number:</b>		PR 1170 <i>(Not a model number)</i>
<b>Part Numbers</b>	<b>(120V, 60Hz) US:</b>	8151500000
	<b>(240V, 50Hz) AUS:</b>	8151503000
	<b>(230V, 50Hz) UK:</b>	8151504000
	<b>(230V, 50Hz) EUR:</b>	8151506000
	<b>(100V, 50/60Hz) JPN:</b>	8151507000
<b>Power Requirement:</b>		85W max
<b>Power Output:</b>		12.5W RMS into 8Ω @ 5%THD
<b>Power Amp Sensitivity:</b>		12mV for 12.5W into 8 ohms @ < 5%THD
<b>Impedances</b>	<b>INST 1 Input:</b>	1MΩ
	<b>INST 2 Input:</b>	136kΩ
	<b>Power Amp Out:</b>	8Ω minimum
<b>Speaker Complement:</b>		One Celestion G12-65 12", 8 ohm, 65W max (P/N 0081989000)
<b>Dimensions</b>	<b>Height:</b>	16.75 in (43 cm)
	<b>Width:</b>	20 in (51 cm)
	<b>Depth:</b>	9.5 in (24 cm)
<b>Weight:</b>		25 lbs (11.5 kg)

*Product specifications are subject to change without notice*

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## SERVICE NOTES

1. **CHASSIS REMOVAL** is accomplished by first removing the four (4) screws holding the upper back panel to the cabinet. Second, disconnect the EMC ground wire by removing the #8 x 1/4" screw which secures the ground wire to the aluminum foil side of the upper back panel. Next, remove the screw from the cable clamp holding the power cable to the interior side of the cabinet and disconnect the 1/4" speaker plug from the speaker jack. Finally, locate the two (2) #10 hex nuts inside the chassis and hold them in place while removing the two (2) screws on the top of the cabinet. The chassis may be partially held in place by the transformer bracket, but will slide freely toward the back of the cabinet to complete the removal process. Reinstallation is performed by reversing the above procedure.
  2. **SPEAKER REMOVAL** is accomplished by removing the back panels and chassis first. Then disconnect the speaker cable from the amplifier. Lastly, remove the four (4) hex nuts securing the speaker to the baffle. Reinstallation is performed by reversing the above procedure.
  3. **MAIN PCB REMOVAL** is not recommended due to the hand hard-wired nature of the amplifier. If the underside of the PCB must be accessed, the PCB may be partially lifted out of the chassis using the following procedure:
    - a. Unplug the amplifier and allow time for the power supply capacitors to discharge.
    - b. Remove the paper jack guard, volume controls, tone control, input jacks, brass strip, pilot light, and power switch from the chassis front panel.
    - c. If desired, the volume controls, tone control, and input jacks can be reassembled onto the brass strip. This can act like a temporary sub-assembly to help keep things straight.
    - d. Remove the six (6) PCB mounting screws and carefully lift the PCB.Reinstallation is performed by reversing the above procedure.
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## PCB EXCHANGE POLICY

Parts marked with a single asterisk (\*) in the Part Lists are not field replaceable. If a failure due to one of these components is detected, please con-

tact the FMIC Customer Service Department to order the complete PCB Assembly.

## CIRCUIT DESCRIPTION

This section provides concise information about new or unusual circuitry designs incorporated into this amplifier model. The purpose is to aid the service technician by providing insight into the design areas most likely to become obstacles in troubleshooting. Information is focused for its effective use while maintaining the security of Fender® proprietary information wherever possible.

### PREAMP CIRCUIT & TONE STACK

There are two (2) guitar input channels for the amplifier: 1 and 2. Each input jack is connected to the preamp gain stage by a 68kohm input resistor. INPUT 1 has a switched ground connection, while INPUT 2 has a switched signal connection to INPUT 1's jack. This creates four scenarios for each input.

1. If nothing is connected to either input jack, INPUT 1 jack provides a grounded signal via its switched ground connection.
2. If only INPUT 1 jack is used, the ground is disconnected and the input signal is routed through both jacks and both input resistors to the grid of the preamp tube (V1-B).
3. If only INPUT 2 jack is used, the signal is routed through a voltage divider formed by the input resistors and the switched ground connection of INPUT 1's input jack. This reduces the input signal level seen at the preamp tube's grid by about 6dB, and makes the input impedance for INPUT 2 much lower.

4. If both the input jacks are used, each input signal is routed through its respective jack and input resistor, with the signals summing at the grid of the preamp tube.

After the preamp gain stage, the signal from each input is routed through an AC coupling cap (C3) to the volume control potentiometer (R11). After the volume control, the two signals are fed to the tone stack.

The main section of the tone stack is formed by capacitors C4 & C5, and the TONE control potentiometer R10. C4 and R10 provide a bypass path for high frequencies around the volume control. This gives a high frequency 'boost' to the signal, which varies in frequency in level depending on the position of the TONE control (R10).

### POWER AMP

Output of the tone stack circuitry is fed to V2-A, which provides voltage amplification for the power amp. V2-B is a split load phase inverter stage providing both positive and negative half-wave inputs for the push-pull output tubes V3 and V4.

The output tubes V3 and V4 are in a fixed bias configuration. C18-20, D3-4 and C10 derive a negative voltage from the B+ winding. That voltage is divided down by potentiometer, R23 and R40 and fed to the grids of the output tubes via R19 and R20. The adjustment range can accommodate high and low gain power tubes.



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**TREMOLO CIRCUIT**

A variable low frequency oscillator formed by V6-A and V6-B drives the cathode bias voltage of V2-A through R35. This modulates the gain of V2-A creating the tremolo effect. S3 (on the Speed Control, R26) turns the effect ON and OFF by interrupting the feedback path of the oscillator.

**POWER ATTENUATOR**

Actuation of the OUTPUT switch, S4, from HIGH to LOW places an 8 Ohm resistor in series with the speaker and a 16 Ohm resistor in parallel with the transformer output, effectively reducing the power to the speaker to 1/4 while keeping the impedance seen by the transformer constant at 8 Ohms total.

**POWER SUPPLY**

The power transformer has three secondary windings: The green secondary wires provide an AC voltage used to energize the heater filaments of tubes V1 through V4. This heater filament supply circuit is fused by secondary fuse F3.

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The green secondary wires provide an AC voltage used to energize the heater filaments of tubes V1 through V4. This heater filament supply circuit is fused by secondary fuse F3.

The yellow secondary wires provide the heater filament supply voltage to the rectifier tube (V5). This rectifier heater supply circuit is fused by secondary fuse F2.

The red secondary wires provide the high-voltage input to the 5Y3 rectifier tube (V5) through diodes D2 and D3. The output of the 5Y3 rectifier tube (V5) is filtered by capacitors C11 through C13 and resistors R26 and R27 provide the main B+ DC supply for the amplifier. The red wire with a yellow stripe is the center tap for the high voltage secondary. When the Standby Switch (SW2) is in the ON position, this center tap is connected to chassis ground to complete the B+ high-voltage supply circuit.



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<b>PARTS LIST: PCB ASSEMBLY</b>			
<b>QTY.</b>	<b>PART #</b>	<b>DESCRIPTION</b>	<b>REFERENCE DESIGNATION</b>
3	0073305000	CAP AE AX 16uF 475V 20%	C11, C12, C13
3	0073306000	CAP AE AX 25UF 50V 20%	C1, C6, C2
5	0073307000	CAP MPF AXL MWR .1uF 400V 10%	C3, C8, C9, C18, C19
1	0053860000	** CAP MPF .1UF 275V 10%	C14
1	0073308000	CAP MPF AXL MWR .022uF 400V 10%	C7
1	0038690000	CAP AE AX 1uF 100V	C10
4	0025996000	** FUSE CLIP PCB .250 & 5MM FUSE	F2, F3
2	0013737000	** FUSE TD 1-1/4x1/4 250v 4A	F2, F3
1	0091996000	CAP AE AX 1uF 100V 20%	C10
1	0048903000	RES CF 1/2W 18K 5%	R40
1	0037664001	RES CF 1W 1K FP 5%	R38
2	0025116001	RES CF 1/2W 100k 5%	R9, R14
3	0025117001	RES CF 1/2W 220k 5%	R19, R20, R40
3	0026549001	RES CF 1/2W 5% 1.5Kohm	R13, R16, R7
1	0041405001	** RES MOX 2W 5% 22K LL	R26
1	0041740000	** RES MOX FP 2W 5% 4.7K	R27
3	0028857001	RES CF 1/2W 68KOHM 5%	R5, R6, R31
2	0026368001	RES CF 1/2W 100 OHM 5%	R28, R29
2	0047434001	RES CF 1/2W 5% 56k LL	R17, R18
3	0053869001	RES CF 1/2W 1 MEG 5%	R15, R5, R6
1	0028503000	** THERMISTOR 10 ohm 5A C60-11	RT1
2	0024843000	CAP MPF RDL .01uF 400V 10%	C15,16
1	0024839000	CAP MPF RDL .033uF 400V 10%	C17
1	0025832000	RES CF 1/2W 22K 5%	R32
1	0028861000	RES CF 1/2W 3.3k 5%	R35
1	0036926000	RES CF 1/2W 4.7k 5%	R2
2	0062100001	DIODE 1A 400V IN4004	D3, D4
1	0017956000	CONTROL 150K LIN TRIM ADJ	R23

<b>PARTS LIST: TREMOLUX CHASSIS ASSEMBLY</b>			
<b>QTY.</b>	<b>PART #</b>	<b>DESCRIPTION</b>	<b>REFERENCE DESIGNATION</b>
3	0018022000	BUSHING SNAP 5/16x17/32 BLK	OUTPUT XFORMER WIRES
1	0026038000	** BUSHING SR .625x.062x37/64 BLK	@ POWER CORD
1	0026541000	** CABLE ASSY PWR W/.250 TAB 120V	POWER CORD
REF	0048463000	** CABLE ASSY PWR .250 100v	JAPAN POWER CORD
REF	0033331000	** CABLE ASSY PWR 220/240v	EUROPE POWER CORD
REF	0040993000	** CABLE ASSY PWR 5A U.K..250 TAB	UK POWER CORD
REF	0038602000	** CABLE ASSY PWR AUST .250 TAB	AUSTRALIA POWER CORD
1	0073309000	CAP MPF AXL MWR .0047uF 630V 10%	C5
1	0073310000	CAP SILVER MICA 500pF 500V 5%	C4
1	0082018000	CNTRL PNL MNT 3M W/SW	TREMOLO SPEED, R30
1	0032219000	COLLAR-PILOT LIGHT	

\* Non-serviceable part. Replace complete parent assembly. See PCB EXCHANGE POLICY section above.

*shaded* Unique Fender® part. Order directly from the FMIC Parts Department.

*shaded +* \* Access to this part or assembly is controlled. Please contact the FMIC Customer Service Department.

\*\* Safety Requirement part. Replacement must match Safety Agency...-Value, if specified -Type, if specified -Approval Mark(s) if on part.

*shaded +* \*\* Both a unique Fender® part and a Safety Requirement part as defined above.



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PARTS LIST: <b>TREMOLUX CHASSIS ASSEMBLY</b>			
QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
2	0064704000	CONTROL CTS CHS MNT 1M A	
2	0057351001	DIODE 1400V 1.3A #BYD33V/EBT/R	
1	0048827000	** FUSE 1-1/4 X 1/4 F2AL 250V	MAINS FUSE
1	0036702000	** FUSE HOLDER 3AG FINGER GRIP	
REF	0036703000	** FUSE HOLDER 5MM FINGER GRIP	EUROPE, UK, AUSTRALIA
REF	0020789000	** FUSE FAST ACTING 20X5MM F1AL 250V	EUROPE, UK, AUSTRALIA
REF	0057161000	** BOOT TOGGLE SWITCH	EUROPE, UK, AUSTRALIA, JAPAN
1	0075456000	** GUARD JACK 57 CHAMP	
1	0021741000	HOLDER IDAL LITE ASSY PILOT	
1	0081986000	** INSULATOR PCB TREMOLUX	
1	0073949000	** INSULATOR POWER SWITCH	
1	0021956000	JACK PHONE OPEN CIRCUIT 11	J3
3	0021550000	JACK PHONE TIP SHUNT 12A	J1, J2, J4,
1	0025718000	JEWEL PILOT LITE RED #20	
3	0036620000	KNOB CHICKEN HEAD 1/4 SHFT BLK	
1	0069393000	NUT 6-32 HEX EXT LOCK	SAFETY/EARTH GROUND
3	0022012000	NUT HEX 15/32-32x5/8 NI	SWITCHES
4	0016352000	NUT HEX 3/8-32x3/32 TK NI	JACKS
1	0031625000	NUT HOLDER PILOT LIGHT 1/16-27	
4	0022004000	NUT KEPS #8-32 ZINC	POWER TRANSFORMER
1	0081977000	*PCB ASSY TREMOLUX	
1	0021642000	PILOT LIGHT #T47	
2	0053869001	RES CF 1/2W 1 MEG 5%	R1, R2 (@ J1 & J2)
2	0026549001	RES CF 1/2W 5% 1.5kohm	R21, R22 (@ V3 & V4)
2	0028021001	RES MOX 2W 470OHM 5%	R24, R25 (@ V3 & V4)
6	0031184000	SCRW M 6-32x1/4 PHP BLX ITLW	PCB MOUNTING SCREWS
1	0022186000	SCRW M 6-32x3/8 PHP NI	SAFETY/EARTH GROUND
2	0037239000	SCRW TF 8-32x3/8 PHP BLX	OUTPUT TRANSFORMER
13	0038900000	SCRW TF 6-32X1/4 PHP ZI	TUBE SOCKETS, EMC GROUND SCREW
1	0036570000	** SWITCH TOGGLE DPST W/NUTS	POWER
1	0037039000	** SWITCH TOGGLE SPST W/NUTS	STANDBY
1	0025737000	** TAB INSUL 22-18GA .032x.250	@ STANDBY SWITCH
1	5550114302	TUBE 5Y3GT BUTTON BASE	V5
		SELECT OUTPUT TUBES ACCORDING TO HIGH, MED, OR LOW BIAS RANGE	
1	5550113532	TUBE 6V6GTA STR391A DUET LOW	2 MATCHED LOW TUBES V3, V4
1	5550113533	TUBE 6V6GTA STR391A DUET MED	2 MATCHED MED TUBES V3, V4
1	5550113534	TUBE 6V6GTA STR391A DUET HIGH	2 MATCHED HIGH TUBES V3, V4
3	9301310010	TUBE 7025/12AX7A CHINESE	V1, V2, V6
3	0020424000	TUBE RING UNIVERSAL (277H-2)	@ V3, V4, V5
3	0990724000	TUBE SCKT 8 PN	@ V3, V4, V5
3	0990723000	TUBE SHIELD	@ V1, V2, V6
3	0023606000	TUBE SOCKET 9 PIN	@ V1, V2, V6
3	0036891000	WASHER,INT TOOTH .500x.815x.04	SWITCHES
4	0016436000	WASHER,INT TOOTH 3/8x.687x.065 NI	JACKS

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PARTS LIST: <b>TREMOLUX CHASSIS ASSEMBLY</b>			
QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
3	0022293000	WSHR FLAT .473x.750 NI	SWITCHES
7	0031153000	WSHR FLAT 3/8x.614 NI	JACKS/POTS
4	0030007000	WSHR LCK INTL 8x.330x.02	BETWEEN PWR XFMR & CHASSIS
1	0073304000	** XFMR OUTPUT 57 DLX / FNDR 57	
1	0073302000	** XFMR POWER 57 DLX / FNDR 57 120V	
REF	0073301000	** XFMR POWER 57 DLX / FNDR 57 100V	JAPAN
REF	0073303000	** XFMR POWER 57 DLX / FNDR 57 230V/240V	AUSTRALIA, EUROPE, UK
1	0036957001	RES CF 1/2W 5% 470k LL	@V6
1	0025116001	RES CF 1/2W 5% 100k LL	@ R30
1	0036571000	SWITCH PNL MNT SPDT	OUTPUT PWR ATTENUATOR
1	0081954000	RES PWR WW 8 OHM 25WCHS MNT	R33
1	0081988000	RES PWR WW 16 OHM 25W CHS MNT	R34

PARTS LIST: <b>TREMOLUX CABINET ASSEMBLY</b>			
QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	0081984000	*CABINET ASSY TREMOLUX	
1	0081984009	*CABINET UPPER BACK PANEL ASSY	
1	0081984008	*CABINET LOWER BACK PANEL ASSY	
1	0081984010	*COMPLETE BAFFLE ASSY W/CLOTH	
.65 yd <sup>2</sup>	0036131000	CLOTH GRILLE VINTAGE TYPE	
4	0024653000	GLIDE CABINET NICKEL PLATED	
4	0022483000	GLIDE CUSHION RUBBER BLACK (1.02 DIA)	
2	0036478000	** HANDLE CAP NI	
1	0057366000	** HANDLE LEATHER RAISED BRO	
4	0069393000	NUT 6-32 HEX EXT LOCK	BAFFLE
4	0064162000	NUT T 8-32X1/2 STR 3 PRNG BLX	HANDLE
4	0075598000	SCREW CAPTIVE MTG 8-32X1 7/16	BAFFLE
4	0036618000	SCREW M 6-32X1-1/2 OHP BRONZE	BAFFLE
4	0036649000	SCREW M 8-32X3/4 RH PHS NI	HANDLE
4	0026625000	SCRW WOOD 8X1 FH	GLIDES
2.02 ft <sup>2</sup>	0036343000	TWEED	
4	0022376000	WSHR FLAT 6X3/8 NI	BAFFLE

PARTS LIST: <b>TREMOLUX END ITEM ASSEMBLY</b>			
QTY.	PART #	DESCRIPTION	REFERENCE DESIGNATION
1	0073614000	** BRACKET TRANSFORMER 57 DLX / FNDR 57	
1	0038566000	CABLE ASSY SPKR RT ANG 13-1/2"	
1	0022491000	CLAMP CABLE NYL SCRW MNT 5/16	
1	0073295000	COVER 57 DELUXE	
1	0081989000	SPEAKER 12 IN 8OHM STL CER	
1	0073319000	COVER SPEAKER MAGNET BELL JENSEN P12Q	
0	0073209000	** COVER TUBE 57 DELUXE	JAPAN, EUROPE, UK, AUSTRALIA

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<b>PARTS LIST:TREMOLUX END ITEM ASSEMBLY</b>			
<b>QTY.</b>	<b>PART #</b>	<b>DESCRIPTION</b>	<b>REFERENCE DESIGNATION</b>
1	0073948000	** GASKET BRACKET XFMR 57DLX / FNDR 57	
1	0008196400	*BADGE EC SERIES	
1	0081990000	*NAMEPLATE TREMOLUX	
4	0022004000	NUT KEPS #8-32 ZINC	SPEAKER
2	0025819000	NUT KEPS 10-32 ZINC	CHASSIS MOUNTING
2	0036619000	SCREW M 10-32x1-1/2 THP NI	CHASSIS MOUNTING
1	0022095000	SCRW 8X1/4 PHP ZI	EMC GND WIRE (UPPER BACK PANEL)
3	9904101110	SCRW PB 8x5/8 PHP BLX	TRANSFORMER BRACKET, PWR CABLE
8	0016188000	SCRW WOOD 6x1 OHP NI	BACK PANELS MOUNTING
8	0037215000	WSHR C/SUNK NICKEL #6	BACK PANELS MOUNTING

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## **Service Diagram List**

Service Diagram (Schematic)..... TREMOLUX  
Service Diagram (PCB Assembly)..... TREMOLUX

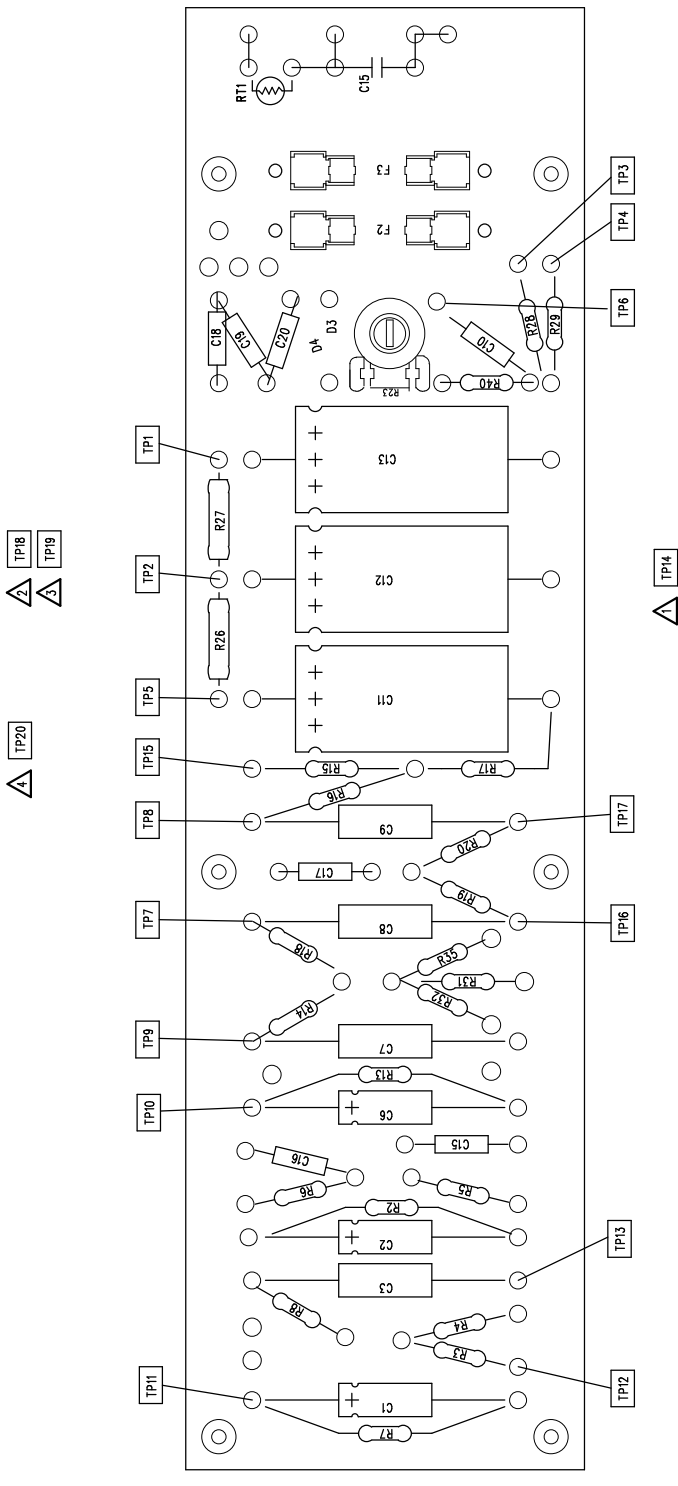
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8 7 6 5 4 3 2 1

D C B A

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PR1170	22-FEB-11	LEL
B	EC 4809	25-JUL-11	LEL



FILM/DWG: SERVICE DIAGRAM  
 DATABASE: Z1170P.PCB DATE: 25-JUL-11

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CHECKED BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_

DRAWN: HAN LE ENGR: L. LORENZEN  
 DATABASE FILE: Z1170P.PCB

MUSICAL INSTRUMENTS  
 Corona, CA U.S.A.

TITLE: SERVICE DIAGRAM, COMBINED (PCB assy)  
 TREMOLUX

SIZE: C DRAWING NUMBER: 0081978000 REV: B  
 RELEASE DATE: 22-FEB-11 SHEET 2 OF 2

- 6. WIRES NOT SHOWN FOR CLARITY.
  - 5. SEE SHEET 1 FOR PRIMARY WIRING, TEST CONDITIONS, AND TEST POINT VALUES.
  - ▲ TP20 IS TIP TERMINAL OF PHONE JACK J5 (SPEAKER OUTPUT).
  - ▲ TP19 IS PIN 3 OF TUBE V4.
  - ▲ TP18 IS PIN 3 OF TUBE V3.
  - ▲ TP14 IS CENTER TERMINAL OF R10 (TONE CONTROL).
- NOTES: (UNLESS OTHERWISE NOTED)

D C B A

8 7 6 5 4 3 2 1